Amendments to the Claims

The listing of claims below replaces all prior versions and listings of claims in the application:

CLAIMS

The invention claimed is:

1. (previously presented) A system for measuring a voltage differential in a current-carrying pipe using a propulsion vehicle for conveying the system inside the pipe, the system comprising:

a first contact for maintaining electrical contact with the pipe as the vehicle moves through the pipe;

a second contact positioned in a spaced apart relationship from said first contact for maintaining electrical contact with the pipe as the vehicle moves through the pipe; and

a voltage reading device connected to said first contact and said second contact for measuring the voltage between said first contact and said second contact as the vehicle moves through the pipe, wherein the voltage error is reduced to a microvolt range.

2. (previously presented) The system of Claim 1 wherein said propulsion vehicle is a pig.

3. (previously presented) The system of Claim 1 wherein said first contact comprises one more devices for maintaining electrical contact between said pipe and said first contact.

4. (previously presented) The system of Claim 3 wherein at least one of said devices is a brush.

5. (previously presented) The system of Claim 3 wherein at least one of said devices is a knife.

6. (previously presented) The system of Claim 3 wherein at least one of said devices is configured to reduce noise received by said voltage reading device.

7. (previously presented) The system of Claim 3 wherein said second contact comprises one or more devices for maintaining electrical contact between said pipe and said second contact.

8. (previously presented) The system of Claim 1 wherein said first contact comprises at least one of a plurality of brushes and knives.

9. (canceled)

10. (previously presented) The system of Claim 1 wherein said first contact comprises at least one brush.

11. (previously presented) The system of Claim 1 wherein said first contact comprises at least one knife.

12. (canceled)

13. (previously presented) The system of Claim 1 further comprising one or more electromechanical devices connected to said first contact for reducing noise received by said voltage reading device.

14. (previously presented) The system of Claim 13 wherein said electromechanical device is a mercury contact.

15. (previously presented) The system of Claim 13 wherein said electromechanical device is a slip ring contact.

16. (previously presented) The system of Claim 1 further comprising means for compensating for thermocouple voltages.

17. (previously presented) The system of Claim 16 wherein said means comprise a determination of bulk fluid reference voltages.

18. (previously presented) The system of Claim 1 further comprising means for compensating for no contact events.

19. (previously presented) The system of Claim 18 wherein said means comprise an alternating current pilot signal.

20. (previously presented) The system of Claim 1 further comprising a location device for determining the position of said vehicle in the pipe.

21. (previously presented) The system of Claim 20 wherein said location device is an odometer.

22. (previously presented) A method for measuring a voltage differential in a current-carrying pipe, the method comprising:

inserting a propulsion vehicle into said pipe;

utilizing a first contact positioned on said propulsion vehicle to maintain electrical contact with the pipe as the vehicle moves through the pipe;

utilizing a second contact positioned in a spaced apart relationship from said first contact on said propulsion vehicle to maintain electrical contact with the pipe as the vehicle moves through the pipe;

determining the voltage between said first contact and said second contact as the vehicle moves through the pipe, wherein the voltage error is reduced to a microvolt range.

23. (original) The method of Claim 22 further comprising determining the position of the vehicle in the pipe.

24. (original) The method of Claim 23 wherein determining the position of the vehicle in the pipe utilizes an odometer.

25. (original) The method of Claim 23 wherein the position of the vehicle in the pipe is tracked in real time.

26. (original) The method of Claim 25 wherein said tracking utilizes a satellite and/or acoustic device.

27. (original) The method of Claim 23 further comprising outputting voltage and position data.

28. (original) The method of Claim 22 wherein said propulsion vehicle is a pig.

29. (original) The method of Claim 22 wherein said first contact comprises one more devices for maintaining electrical contact between said pipe and said first contact.

30. (original) The method of Claim 29 wherein at least one of said devices is a brush.

31. (original) The method of Claim 29 wherein at least one of said devices is a knife.

32. (original) The method of Claim 29 wherein at least one of said devices is configured to reduce noise in a voltage signal.

33. (original) The method of Claim 22 wherein said first contact comprises at least one of a plurality of brushes and knives.

34. (canceled)

35. (original) The method of Claim 22 further comprising utilizing one or more electromechanical devices connected to said first contact to reduce noise in a voltage signal.

36. (original) The method of Claim 35 wherein said electromechanical device is a mercury contact.

37. (original) The method of Claim 35 wherein said electromechanical device is a slip ring contact.

38. (original) The method of Claim 22 further comprising compensating for thermocouple voltages.

39. (original) The method of Claim 38 wherein said compensation comprises a determination of a bulk fluid reference voltage.

40. (original) The method of Claim 22 further comprising compensating for no contact events.

41. (original) The method of Claim 40 wherein said compensation comprises utilizing an alternating current pilot signal to identify said no contact events.

42. (previously presented) A system for measuring a voltage differential a current-carrying pipe using a propulsion vehicle for conveying the system inside the pipe, the system comprising:

a first contact for maintaining electrical contact with the pipe as the vehicle moves through the pipe, wherein said first contact comprises at least one of a plurality of brushes and knives;

a second contact positioned in a spaced apart relationship from said first contact for maintaining electrical contact with the pipe as the vehicle moves through the pipe, wherein said second contact comprises at least one of a plurality of brushes and knives; and

a voltage reading device connected to said first contact and said second contact for measuring the voltage between said first contact and said second contact as the vehicle moves through the pipe, wherein the voltage error is reduced to a microvolt range.

43. (new) The system of claim 42, wherein the first contact comprises at least one rotating brush.

44. (new) The system of claim 42, wherein the first contact comprises a plurality of rotating brushes.

45. (new) The system of claim 42, wherein the first contact and the second contact comprise at least one rotating brush.

46. (new) The system of claim 1, wherein the first contact comprises at least one rotating brush.

47. (new) The system of claim 1, wherein the first contact comprises a plurality of rotating brushes.

48. (new) The system of claim 1, wherein the first contact and the second contact comprise at least one rotating brush.

49. (new) The method of claim 22, wherein the first contact comprises at least one rotating brush.

50. (new) The method of claim 22, wherein the first contact comprises a plurality of rotating brushes.

51. (new) The method of claim 22, wherein the first contact and the second contact comprise at least one rotating brush.